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⑤④ Equipment for loading an exchange platform or a container.

⑤⑦ Equipment for loading an exchange platform or a container onto a truck or truck trailer and for removal of it from same, and possibly additionally for dumping it. The equipment comprises an auxiliary frame (2) pivotably mounted onto the chassis beams (1) of the truck or trailer by means of a transverse horizontal shaft or articulated joints (3) fitted to the chassis beams at a distance forwards from the support rolls fitted at the rear ends of the chassis beams (1), to which said auxiliary frame (2) a loading frame (10, 10', 10'') is attached by one end pivotably by means of a transverse horizontal shaft or articulated joints (14), the free end of the said loading frame being provided with a grasping means (15, 15', 15'') for engaging the grasping member of the exchange platform or container.

The cylinder-piston device (11) independently pivoting the loading frame (10, 10', 10'') in relation to the auxiliary frame (2) is at one end fixed to the free end of the auxiliary frame (2) by means of an articulated joint (12) and, at the other end, by means of an articulated joint (13) to the loading frame (10, 10', 10''). Thereat the articulated joint (14) between the loading frame (10, 10', 10'') and the auxiliary frame (2) is located between the articulated joint (13) between auxiliary frame (2) and chassis beams (1) and the articulated joint (12) between auxiliary frame (2) and cylinder-piston device (11), for example, substantially equally far from both of them.

The main cylinder-piston device (4) or two parallel main

cylinder-piston devices operating the loading equipment have been arranged to be fixed, at one end, by means of articulated joint(s) (5), to the chassis (1) of the truck or trailer and, at the other end, by means of articulated joint(s) (6), to the auxiliary frame (2).

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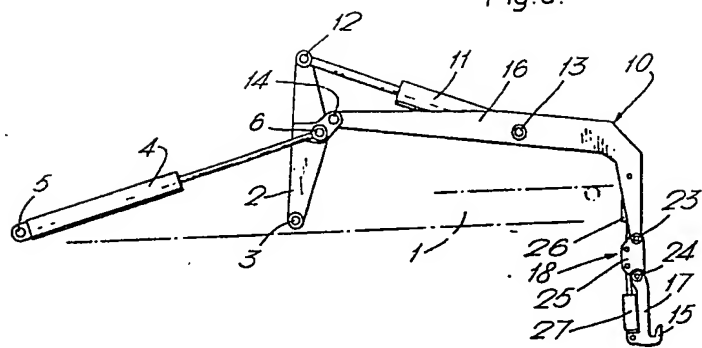
Equipment for loading an exchange platform or a container

The present invention is concerned with
5 equipment for loading an exchange platform or a container onto a truck or truck trailer and for removal of it from same, and possibly additionally for dumping it, whereat the equipment comprises an auxiliary frame pivotably mounted onto the chassis beams of the truck
10 or trailer by means of a transverse horizontal shaft or articulated joints fitted to the chassis beams at a distance forwards from the support rolls fitted at the rear ends of the chassis beams, to which said auxiliary frame a loading frame is attached by one end pivotably
15 by means of a transverse horizontal shaft or articulated joints, the free end of the said loading frame being provided with a grasping means for engaging the grasping member of the exchange platform or container.

The object of the present invention is to
20 provide a simple and reliable hook-device type loading equipment, which can be manufactured as of a relatively low weight and whose operation does not require location of the grasping member of the exchange platform at the upper edge of the middle portion of the front
25 end of the exchange platform, but the grasping member may be located favourably at each end of the exchange platform at the middle of the bottom edge. In such a case, the frame of the exchange platform construction also becomes more robust and of lower weight.

30 The loading equipment in accordance with the invention is mainly characterized in that the cylinder-piston device independently pivoting the loading frame in relation to the auxiliary frame is at one end fixed to the free end of the auxiliary frame by means of an
35 articulated joint and, at the other end, by means of an articulated joint to the loading frame, the articulated joint between the loading frame and the auxiliary

Fig. 6.



frame being placed between the articulated joint between auxiliary frame and chassis beams and the articulated joint between auxiliary frame and cylinder-piston device, for example, substantially equally far from both of them, and that the main cylinder-piston device or two parallel main cylinder-piston devices operating the loading equipment have been arranged to be fixed, at one end, by means of articulated joint(s), to the chassis of the truck or trailer and, at the other end, by means of articulated joint(s), to the auxiliary frame.

The invention comes out more closely from the following description and from the attached drawings, wherein

Figures 1 to 3 are schematical side views of an embodiment of the loading equipment fitted to the vehicle in different loading positions,

Figure 4 is a side view of a vehicle provided with loading equipment in accordance with Figures 1 to 3, the loading equipment being in the transport position,

Figure 5 shows the vehicle of Figures 1 to 4 with the loading equipment in the dumping position,

Figures 6 to 8 are more detailed side views of the loading equipment of Figures 1 to 5 in different loading positions,

Figure 9 shows an alternative embodiment of the guide construction of the grasping means of the loading equipment shown in Figures 6 to 8,

Figures 10 to 12 are schematical side views of a simplified modification of the loading equipment shown in Figures 1 to 8,

Figures 13 to 15 are schematical side views of a vehicle that is provided with an embodiment of loading equipment alternative to that shown in Figures 1 to 8, as shown in different loading positions,

Figure 16 is a side view of the vehicle shown in Figures 13 to 15, the loading equipment being in the transport position, and

Figure 17 is a side view of the vehicle shown in Figures 13 to 16, the loading equipment being in the dumping position.

In the embodiment of Figures 1 to 8, the loading equipment comprises an auxiliary frame 2 pivotably mounted onto the chassis beams 1 of the truck or truck trailer by means of a transverse horizontal shaft or articulated joints 3 fitted to the chassis beams at a distance forwards from the support rolls fitted at the rear ends of the chassis beams 1. To the auxiliary frame 2, a loading frame 10 is attached by one end pivotably by means of a transverse horizontal shaft or articulated joints 14, the free end of the said loading frame being provided with a grasping means 15. The loading frame 10 consists of a middle portion 16 of angular shape and of an extension part 17, which are connected to each other by means of an articulated joint. For the purpose of pivoting the auxiliary frame 2 in relation to the chassis beams 1 around a horizontal shaft or articulated joints 3, a main cylinder-piston device 4 or two parallel main cylinder-piston devices are provided so as to be fixed at one end, by means of an articulated joint 5, to the vehicle chassis 1 and at the other end, by means of an articulated joint 6, to the auxiliary frame 2.

For the purpose of pivoting the loading frame 10 independently in relation to the auxiliary frame 2, a cylinder-piston device 11 is fitted between them, being at one end fixed by means of an articulated joint 12 to the free end of the auxiliary frame 2 and, at the other end, by means of an articulated joint 13 to the middle portion 16 of the loading frame 10. In such a case, the articulated joint 14 between the loading frame 10 and the auxiliary frame 2 is located between the articulated joint 3 between auxiliary frame 2 and chassis beams 1 and the articulated joint 12 between auxiliary frame 2 and cylinder-piston device 11,

for example, substantially equally far from both of them. In any case, the articulated joint 14 must be placed at a sufficient distance from the articulated joint 3 and the articulated joint 12.

5 Thus, the horizontal part of the middle portion 16 of the loading frame 10 is attached to the auxiliary frame 2, and the extension part 17 is attached by means of an articulated joint to the upper end of the vertical part of the middle portion 16 (as viewed
10 in the transport position). The articulated joint 18 between the middle portion 16 and the extension part 17 is shown in more detail in Figures 6 to 8. In accordance with them, one end of the connecting part 25 is, by means of an articulated joint 23, connected to the
15 end of the middle portion 16 and the other end, by means of an articulated joint 24, to the end of the extension part 17. Between the middle portion 16 and the connecting part 25, a cylinder-piston device 26 is fitted by means of articulated joints. Also, a
20 cylinder-piston device 27 is fitted between the connecting part 25 and the extension part 17 by means of articulated joints.

 The loading equipment in accordance with Figures 1 to 8 operates as follows. When the loading
25 equipment is brought to the position shown in Figures 1 and 6, the grasping means 15 provided at the end of the extension part 17 is located near the ground surface. In this position, the vehicle is backed towards the exchange platform or container so that the
30 grasping means 15 is positioned underneath the grasping member 9 of the exchange platform or container.

 The grasping member 9 of the exchange platform 8 is placed in the middle at the lower edge of the end of the platform, whereat it is possible to pull
35 the exchange platform 8 onto the vehicle by any one of its ends. When the auxiliary frame 2 is being pulled by means of the main cylinder-piston device 4, the

auxiliary frame 2 pivots around the articulated joints 3 towards the position in which the auxiliary frame 2 is placed on the chassis beams 1 in the horizontal position as pivoted forwards. Along with the auxiliary
5 frame 2, the middle portion 16 of the loading frame 10 pivots, and the middle portion 16 pulls the exchange platform 8 up by means of the extension part 17. During the lifting movement, the extension part 17 pivots or it is pivoted in the direction shown in Figures 2 and 3
10 in order that the exchange platform 8 should not be inclined excessively. From the position of Fig. 2 forwards, the loading frame 10 is pulled by means of the cylinder-piston device 11, whereat the middle portion 16 of the loading frame pivots forwards around the
15 articulated joint 14 towards the transport position. The transport position comes out from Fig. 4. Therein the extension part 17 of the loading equipment has been pivoted by means of the cylinder-piston devices 26 and 27 to alongside the vertical part of the middle portion
20 16, whereat the grasping means 15 of the extension part 17 is placed close to the angle point of the middle portion 16. The removal of the exchange platform 8 from the vehicle takes place in the opposite order, as compared with the above. When the exchange platform
25 8 is to be dumped, the dumping is performed by using the main cylinder-piston device 4 as well as the cylinder-piston devices 26 and 27 between the middle portion 16 and the extension part 17, whereat the loading equipment can be brought to the dumping position shown in Fig. 5.
30

In the embodiment described above, two cylinder-piston devices 26 and 27 were required between the middle portion 16 and the extension part 17 to bring about a relative pivoting movement between them.
35 In Fig. 9, an embodiment alternative to the embodiment described above is shown, wherein the relative pivoting movement between the middle portion 16 and the extension

part 17 around the articulated joint 18" is brought about by means of a single cylinder-piston device 19'. The bottom end of the cylinder-piston device 19' is attached to the middle portion 16 near its angle point, and the upper end is attached by means of an articulated joint to a lever 28, whose opposite end is attached by means of an articulated joint to the middle portion 16 at point 33. Between the lever 28 and the extension part 17, a lever 29 is attached by its ends by means of articulated joints. When the extension part 17 is to be pivoted from the lower position shown in Fig. 9 to the upright position, the lever 28 is pulled by means of the cylinder-piston device 19', whereat the movement is transmitted by the lever 29 to the extension part 17 and the extension part is pivoted around the articulated joint 18". Fig. 9 also schematically shows the equipment construction by means of which the grasping member 9 of the exchange platform 8 is locked to the grasping means 15 for the time of loading and transportation. The locking lever 30 is, by means of an articulated joint 31, attached to the extension part 17, and it can be pivoted by means of the operating means 32 in relation to the articulated joint 31 to the locking position shown in Fig. 9, and, on the other hand, the locking can be opened by, by means of the operating means 32, turning the locking lever 30 aside from the locking position, whereat the grasping means 15 can be lowered away from the grasping member 9 of the exchange platform 8. In the embodiment shown in Figures 1 to 8, of course, the extension part 17 must also be provided with such locking means by which the grasping member 9 of the exchange platform 8 can be locked to the grasping means 15 for the time of loading and transportation. The equipment concerned may, of course, be similar to that illustrated in Fig. 9.

The embodiment shown in Figures 10 to 12 differs from that shown in Figures 1 to 8 in the

respect that therein the loading frame 10" has no articulated joint 18. Thus, the loading frame 10" comprises only a horizontal part 21 and a vertical part 22. The free end, i.e. the upper end, of the vertical part 22 is provided with the grasping means 15". Such loading equipment is meant for loading and unloading such an exchange platform onto and off the vehicle wherein the grasping member 9' of the exchange platform 8' is placed at the middle of the front end of the exchange platform at its upper edge. In this embodiment, it is not necessary to lower the grasping means 15" down to the ground surface, but it is enough that it is lowered to the level of the grasping member 9' of the exchange platform 8', as comes out from Fig. 10. The vehicle is backed towards the exchange platform 8' so that the grasping means 15" engages the grasping member 9'. Hereupon the auxiliary frame 2 is pulled by means of the main cylinder-piston device 4 to the position shown in Fig. 11, whereat the loading frame 10" follows along with the auxiliary frame, and the loading frame 10" again pulls along the exchange platform 8'. Next, by operating the cylinder-piston device 11, the loading frame 10" is brought to the transport position, which comes out from Fig. 12. The removal of the exchange platform 8' off the vehicle takes place in the sequence opposite to that described above.

In the embodiment shown in Figures 13 to 17, the middle portion 16' of the loading frame 10' is a straight piece and not an angular piece, like in the embodiment of Figures 1 to 8. The extension part 17' is attached by means of an articulated joint 18' to the end of the middle portion 16', and the grasping means 15' is attached to the free end of the extension part 17' by means of an articulated joint 20. Between the middle portion 16' and the extension part 17', a cylinder-piston device 19 is attached by means of

articulated joints in the way coming out from Figures 13 to 15. The loading equipment in accordance with the embodiment of Figures 13 to 17 operates as follows. The loading equipment is brought to the position shown in Fig. 13, in which position the grasping means 15' is close to the ground level. The vehicle is backed so that the grasping means 15' becomes positioned underneath the grasping member 9 of the exchange platform 8. The auxiliary frame 2 is pulled by means of the main cylinder-piston device 4, whereat the auxiliary frame 2 pivots around the articulated joints 3 forwards towards the position in which the auxiliary frame 2 is shown in Fig. 14. Along with the auxiliary frame 2, both the middle portion 16' and the extension part 17' are pivoted. From the position shown in Fig. 14 forwards, the middle portion 16' is pulled by means of the cylinder-piston device 11, whereat the middle portion 16' is pivoted in relation to the articulated joint 14 towards the position shown in Fig. 15. Last, the extension part 17' is pivoted down forwards by means of the cylinder-piston device 19, to the transport position shown in Fig. 16. When the exchange platform 8 is removed off the vehicle, the operations described above are carried out in the opposite sequence. When the exchange platform 8 is supposed to be dumped, this is performed by means of the main cylinder-piston device 4. The dumping position of the exchange platform 8 comes out from Fig. 17.

All of the embodiments of loading equipment are automatic sets of exchange-platform equipment controlled from the driver's cabin of the truck. Thus, the driver does not have to leave the cabin of the vehicle when he operates the equipment. It is an advantage of the embodiments described in Figures 1 to 9 and 19 to 17 that the equipment types concerned grasp the exchange platform at the ground level. Thereby the platform can be made as of a considerably lower weight

and less cost, as compared with the present-day hook-device platforms. Thereby, also, the storage of the exchange platforms by piling one above the other is easier than to-day. The internal forces of such loading equipments are, owing to the lever ratios of the mechanism, low as compared with the present hook-device type loading equipments. By means of the loading equipment in accordance with Figures 1 to 9, it is also possible to load such exchange platforms at which the grasping member is placed in the upper part of the middle of the front end of the exchange platform. The only prerequisite for this is that the sum of the lengths of the extension part 17 and of the vertical part of the middle portion 16 corresponds to the distance of the grasping member of the exchange platform from the vehicle chassis. In such a case, during loading and transportation, the extension part 17 is then all the time kept in the outwardly pivoted position by means of the cylinder-piston devices 26 and 27, whereby, thus, the loading and transportation take place in the way described in the embodiment of Figures 10 to 12.

The paths of movement of the loading equipments in accordance with the invention are relatively low. In such a case, the operation is also possible in spaces covered by ceiling. Of course, the loading equipment may be additionally provided with the possibility of horizontal shifting, whereby pushing of the exchange platform onto a loading ramp is facilitated.

In the loading equipment embodiments of Figs. 1 to 9 and 13 to 17, of course, the dimensioning of the equipment must be such that, when the loading equipment is in the rear-back pivoted position, the angle point of the middle portion 16 of the embodiment of Figs. 1 to 9 and the articulated joint 18' of the embodiment of Figs. 13 to 17, respectively, is behind the support rolls 7, as comes out from Figures 1 and 13.

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~~WHAT IS CLAIMED IS:~~

1. Equipment for loading an exchange platform (8) or a container onto a truck or truck trailer and for removal of it from same, and possibly additionally for dumping it, whereat the equipment comprises an auxiliary frame (2) pivotably mounted onto the chassis beams (1) of the truck or trailer by means of a transverse horizontal shaft or articulated joints (3) fitted to the chassis beams at a distance forwards from the support rolls (7) fitted at the rear ends of the chassis beams (1), to which said auxiliary frame (2) a loading frame (10, 10', 10") is attached by one end pivotably by means of a transverse horizontal shaft or articulated joints (14), the free end of the said loading frame being provided with a grasping means (15, 15', 15") for engaging the grasping member (9) of the exchange platform (8) or container, characterized in that the cylinder-piston device (11) independently pivoting the loading frame (10, 10', 10") in relation to the auxiliary frame (2) is at one end fixed to the free end of the auxiliary frame (2) by means of an articulated joint (12) and, at the other end, by means of an articulated joint (13) to the loading frame (10, 10', 10"), the articulated joint (14) between the loading frame (10, 10', 10") and the auxiliary frame (2) being located between the articulated joint (13) between auxiliary frame (2) and chassis beams (1) and the articulated joint (12) between auxiliary frame (2) and cylinder-piston device (11), for example, substantially equally far from both of them, and that the main cylinder-piston device (4) or two parallel main cylinder-piston devices operating the loading equipment have been arranged to be fixed, at one end, by means of articulated joint(s) (5), to the chassis (1) of the truck or trailer and, at the other end, by means of articulated joint(s) (6), to the

auxiliary frame (2).

2. Equipment as claimed in claim 1,
c h a r a c t e r i z e d in that the loading frame
(10, 10') consists of a middle portion (16, 16') and
5 of an extension part (17, 17'), which are attached to
each other by means of articulated joints, and that
a cylinder-piston device (19, 19') or cylinder-piston
devices (26, 27) are fitted between them for the
purpose of pivoting the extension part (17, 17') in
10 relation to the middle portion (16, 16') around a
transverse horizontal articulated joint (18, 18')
over 90° to 180°.

3. Equipment as claimed in claim 1 or 2,
c h a r a c t e r i z e d in that the loading frame
15 (10') or the middle portion (16) of the loading frame
(10) is, as viewed from the side, an angular piece,
which has a horizontal part and a vertical part, and
that the length of the horizontal part is larger than
the distance of the articulated joint (14) between the
20 auxiliary frame (2) and the loading frame (10, 10')
from the support rolls (7) when the equipment is viewed
in the transport position.

4. Loading equipment as claimed in claims
1 to 3, c h a r a c t e r i z e d in that, by pivoting
25 the auxiliary frame (2) by means of the main cylinder-
piston device (4) or devices in relation to the chassis
(1) of the truck or trailer and by pivoting the middle
portion (16, 16') by means of the cylinder-piston
device (11) in relation to the auxiliary frame (2), the
30 middle portion (16') of the equipment or the horizontal
part of the middle portion (16) can be made to pivot
from its forwardly directed substantially horizontal
position to a rearwardly directed substantially
horizontal position.

35 5. Equipment as claimed in claim 4,
c h a r a c t e r i z e d in that, when the middle
portion (16') or the horizontal part of the middle

portion (16) is position d in the rearwardly substantially horizontal pivoted position, the grasping means (15, 15') extends substantially to the ground level or can at least be brought to the said position so as to engage the grasping member (9) placed at the bottom edge of the middle portion of the end of an exchange platform (8) or container.

6. Equipment as claimed in claim 5, characterized in that between the angular middle portion (16) of the loading frame (10) and the extension part (17), a connection part is attached at both of its ends by means of articulated joints (23, 24) and that between the middle portion (16) and the connection part (25), by means of articulated joints, a cylinder-piston device (26) is provided, and that, between the connection part (25) and the extension part (17), by means of articulated joints, a cylinder-piston device (27) is fitted for the purpose of pivoting the extension part around the articulated joint (18) over 180° between a position placed at the side of the vertical part of the middle portion (16) and being substantially parallel with the said vertical part and a position forming an extension of the vertical part of the middle portion (16) and being substantially parallel with the said vertical part, inside the angle of the middle portion (16).

7. Equipment as claimed in claim 5, characterized in that, when examined in the transport position, the extension part (17) is connected by means of an articulated joint (18") to the upper end of the vertical part of the middle portion (16) of the loading frame (10), and that the lower end of a cylinder-piston device (19') is, by means of an articulated joint, attached to a point near the angle point of the middle portion (16), and the upper end, by means of an articulated joint, to a lever (28), one of whose ends is, by means of an articulated joint (33),

attached to the middle portion (16) at a distance from the articulated joint (18"), the said lever (28) being additionally, at the end to which the cylinder-piston device (19') is connected, by means of an articulated joint, via the lever (29), connected to the upper part of the extension part (17) at a distance from the articulated joint (18"), for the purpose of pivoting the extension part (17) around the articulated joint (18") over 180° between a position placed at the side of the vertical part of the middle portion (16) and being substantially parallel to the said vertical part and a position forming an extension of the vertical part of the middle portion (16) and being substantially parallel to the said vertical part, inside the angle of the middle portion (16).

8. Equipment as claimed in claim 6 or 7, characterized in that locking means have been fitted in connection with the hook constituting the grasping means (15) at the extension part (17) for the purpose of enclosing the grasping member (9) of the exchange platform (8) or container in the gap of the hook of the grasping means (15) for the time of loading, transportation; and dumping.

9. Equipment as claimed in claim 8, characterized in that the locking means include a locking lever, which is attached to the extension part by means of an articulated joint (31) and which is, by means of an operating member (32), arranged so as to be pivoted in relation to the articulated joint (31) between positions in which it, on one hand, closes the hook gap of the grasping means (15) and, on the other hand, opens the gap.

10. Equipment as claimed in claim 5, characterized in that a cylinder-piston device (19) is, by means of articulated joints, fitted between the middle portion (16') and the extension part (17') so as to pivot the extension part indepen-

dently in relation to the middle portion (16') over
90° between a position forming an extension of and
being substantially parallel to the middle portion (16')
and a position substantially perpendicular to the
5 middle portion (16').

11. Equipment as claimed in claim 10,
c h a r a c t e r i z e d in that the grasping means
(15') is, by means of an articulated joint, attached to
the free end of the extension part (17').

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Fig.1.

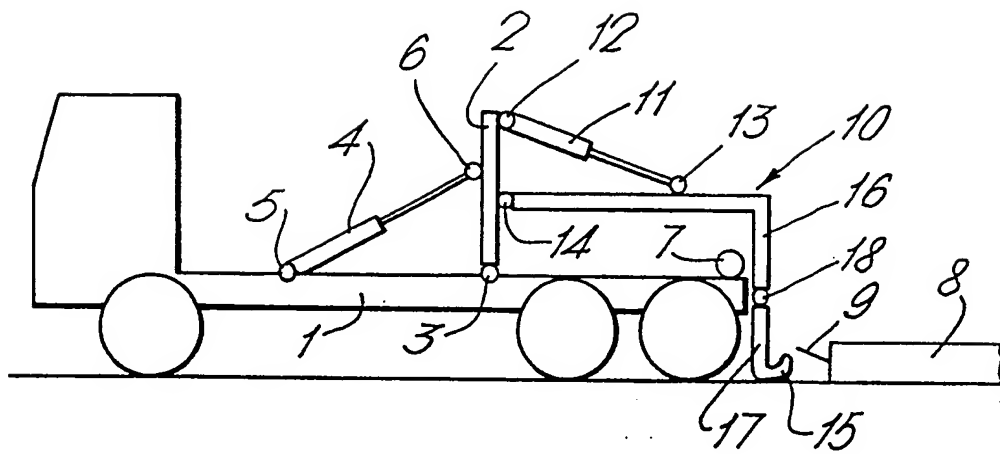
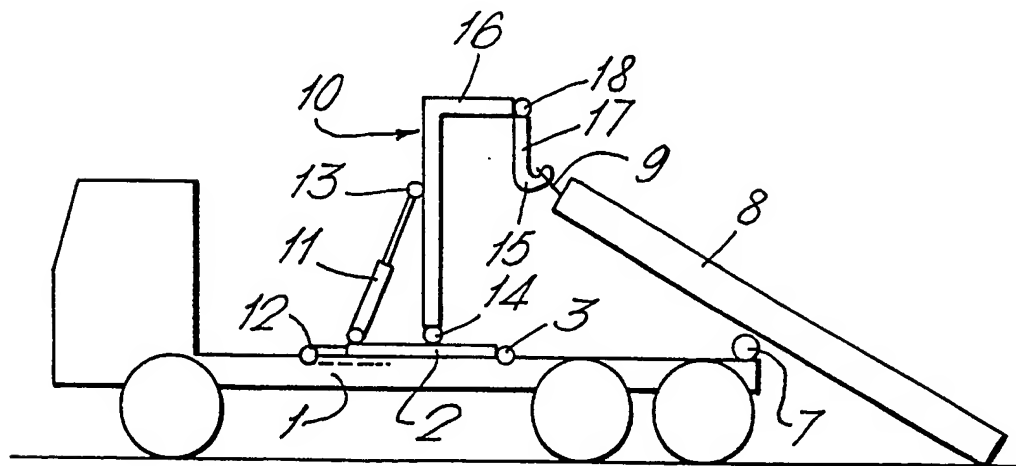


Fig.2.



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Fig.3.

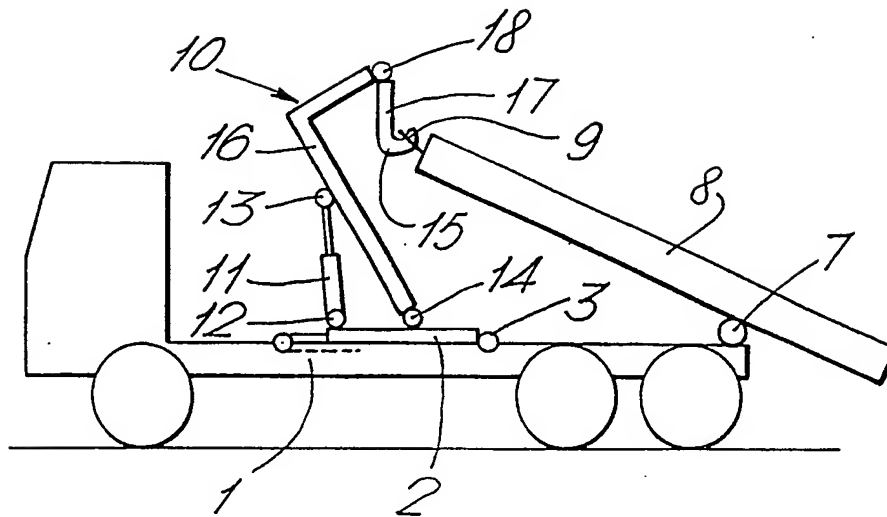
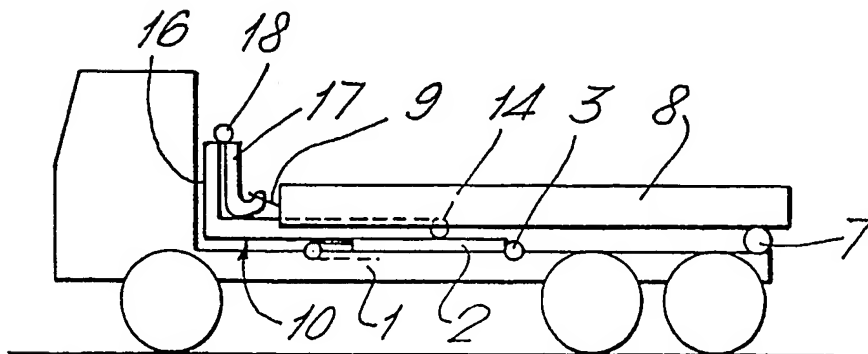


Fig.4.



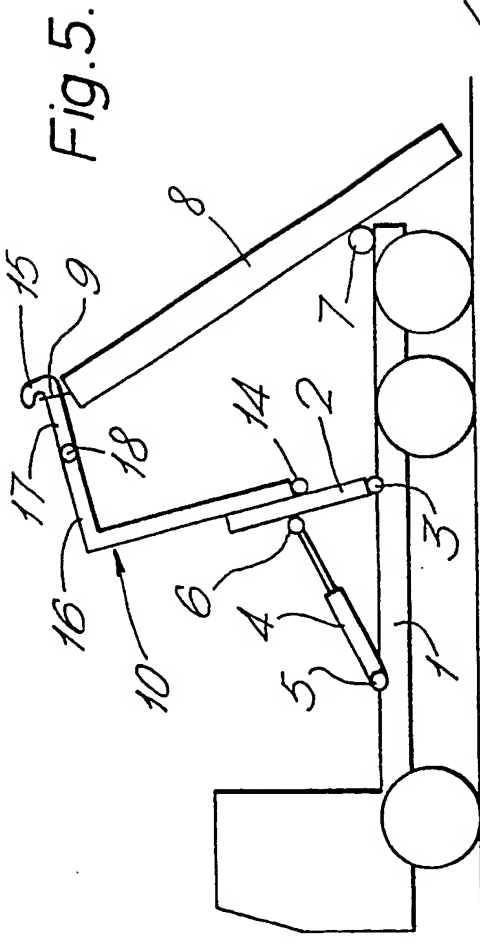
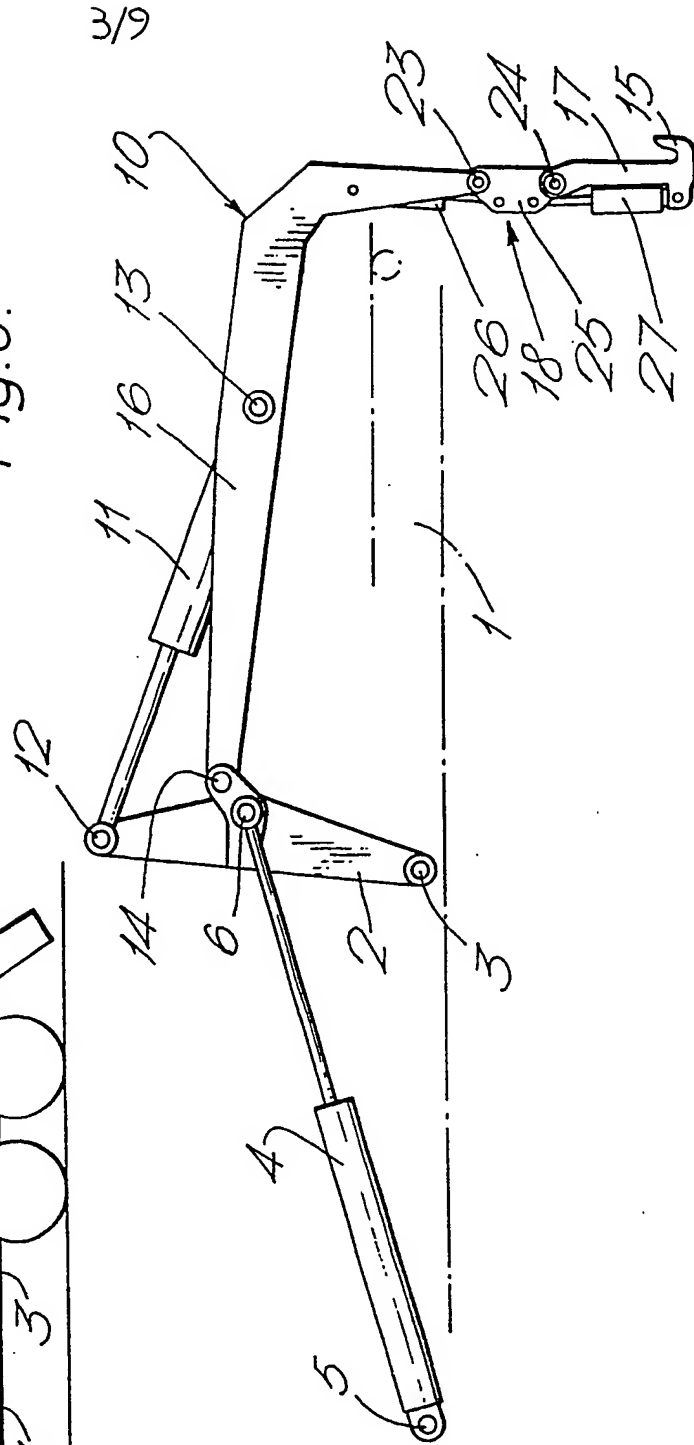
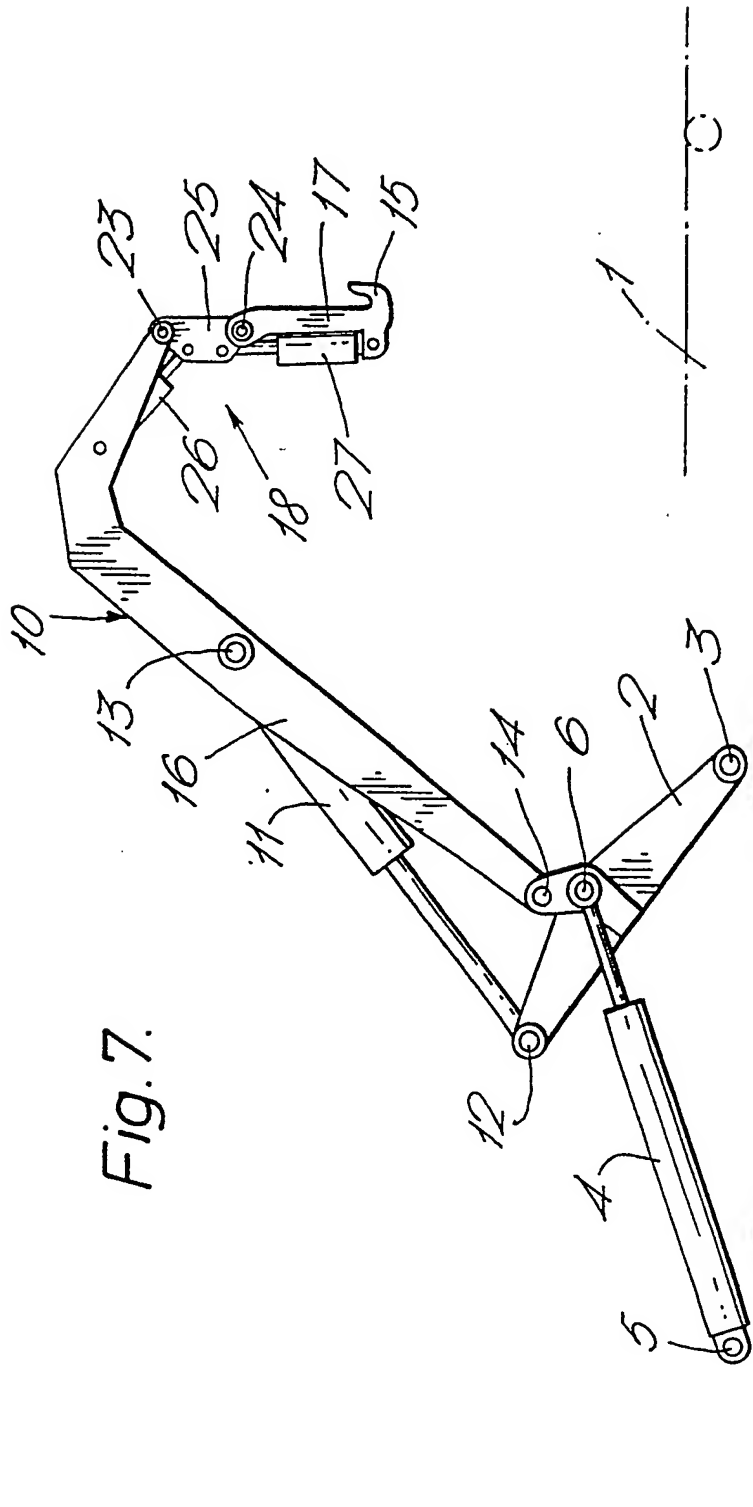


Fig. 6.

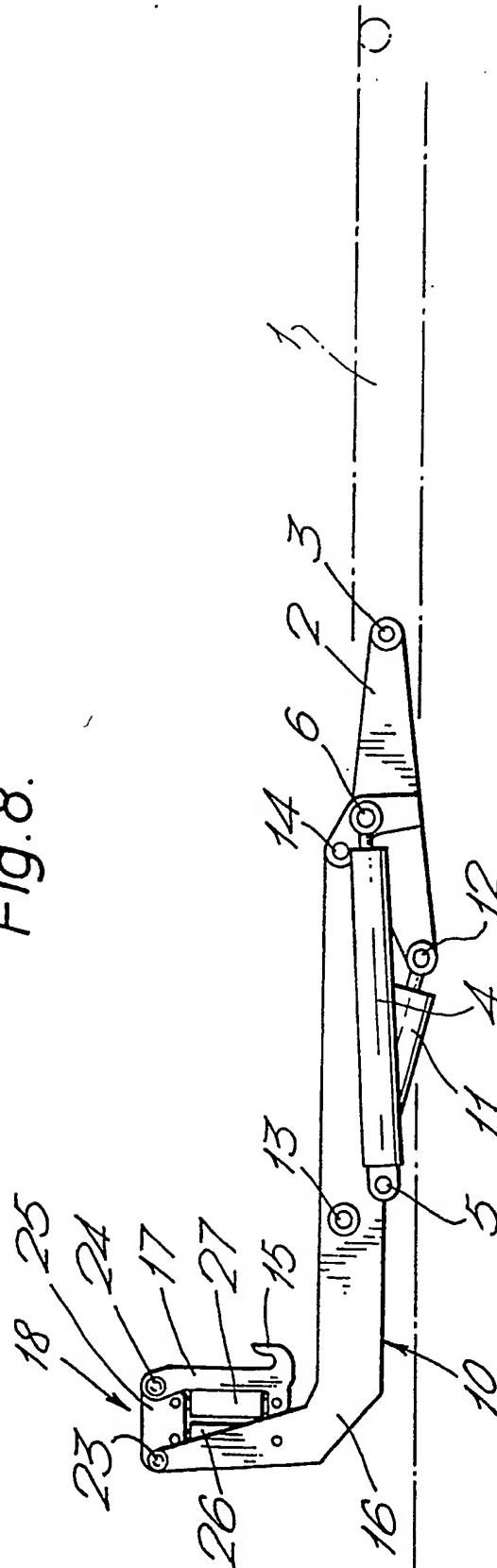


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Fig. 8.



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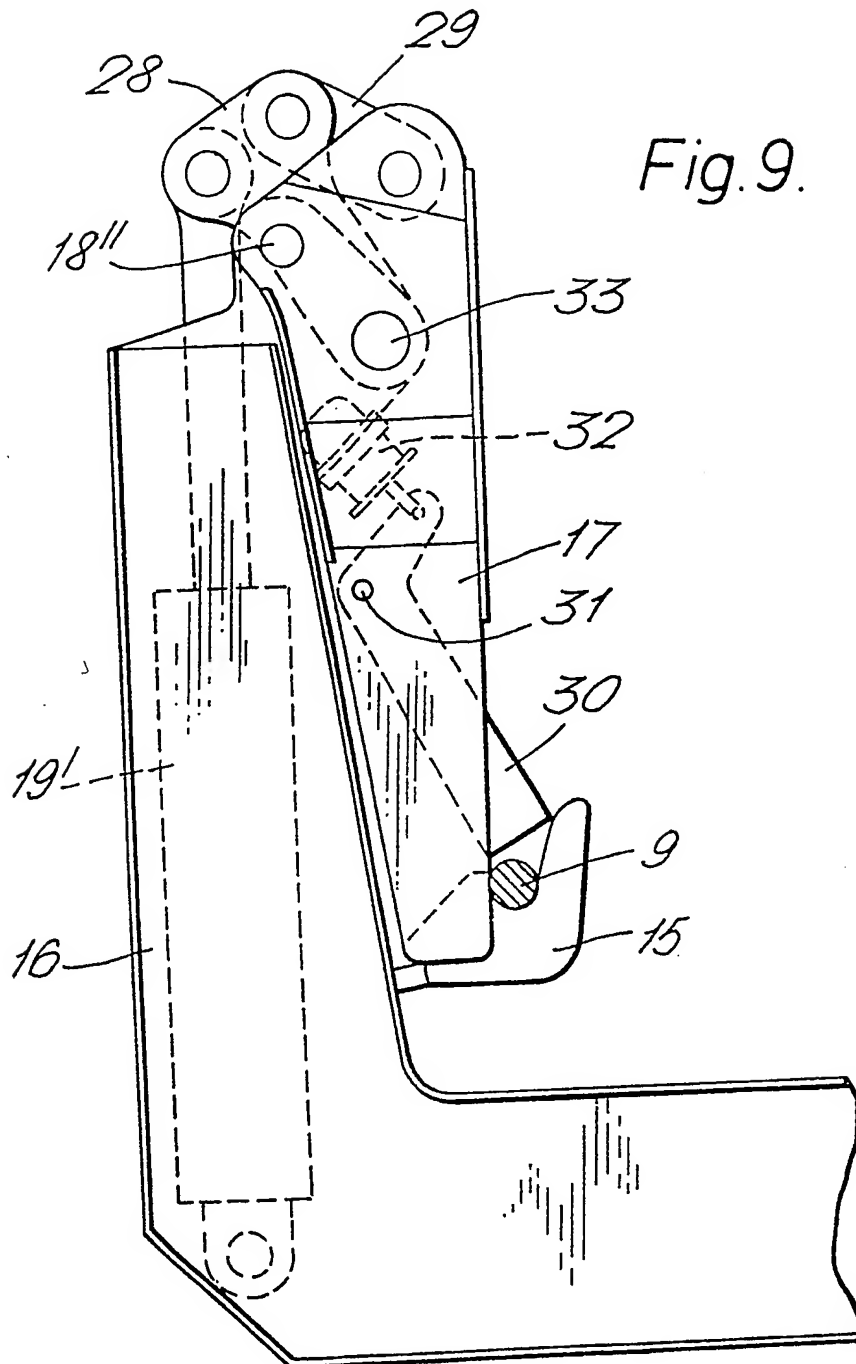


Fig. 10.

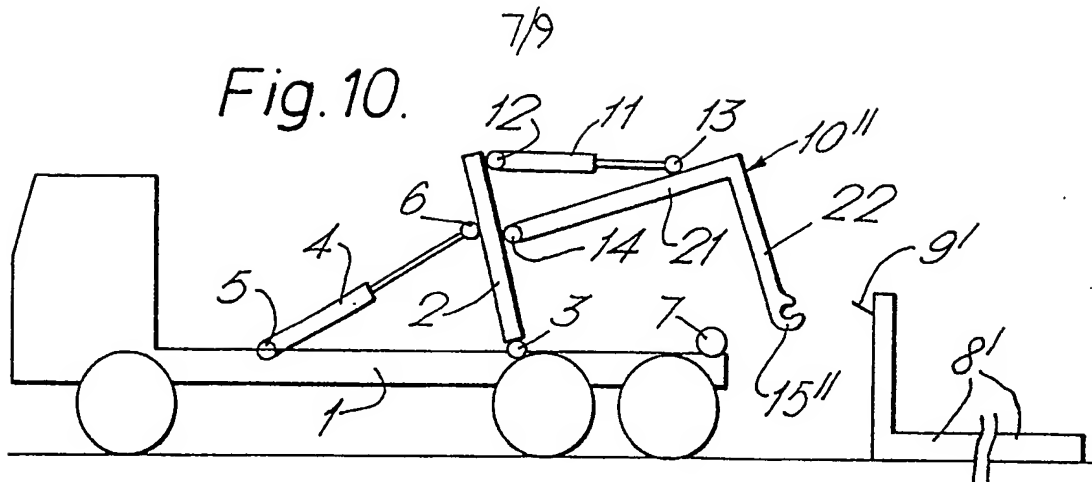


Fig. 11.

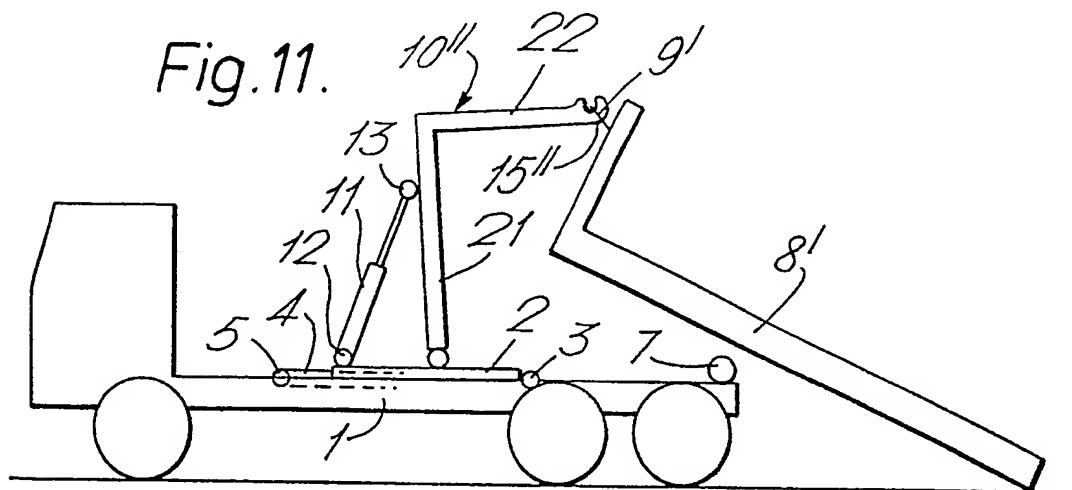
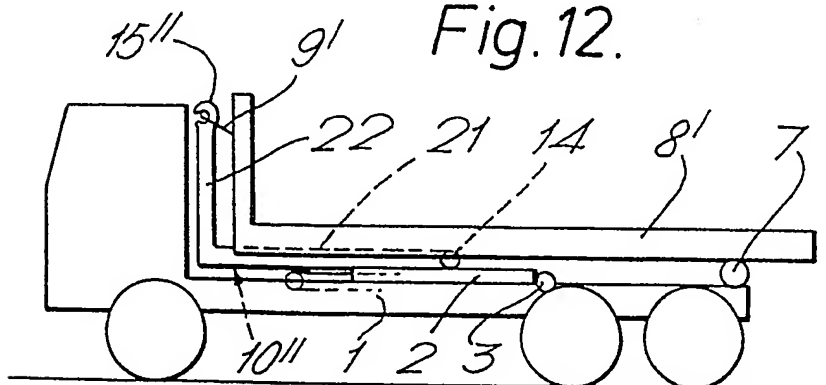


Fig. 12.



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Fig. 13.

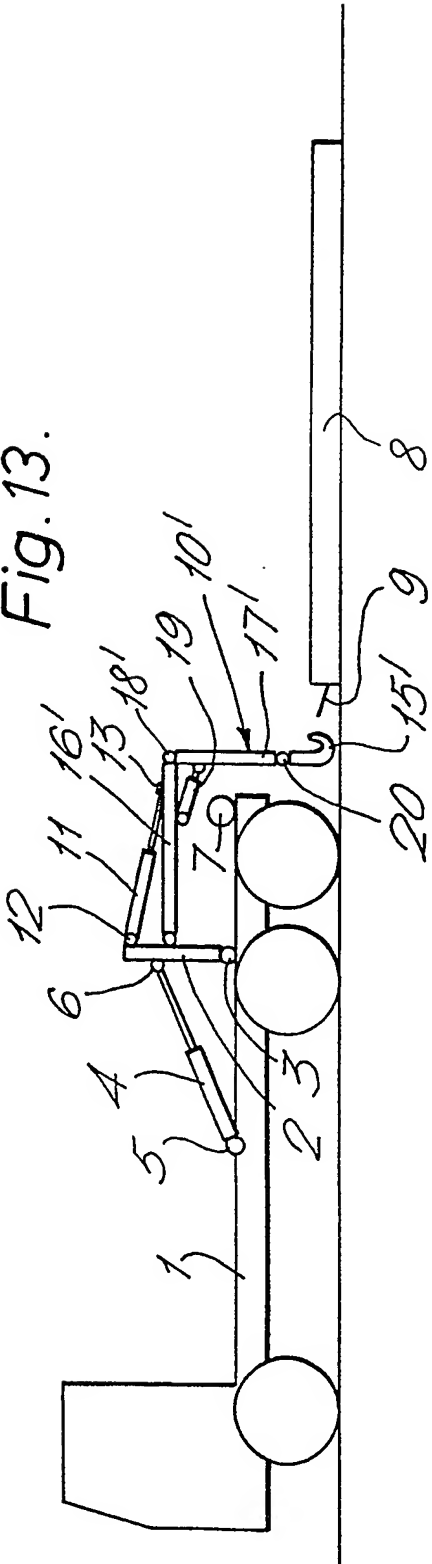
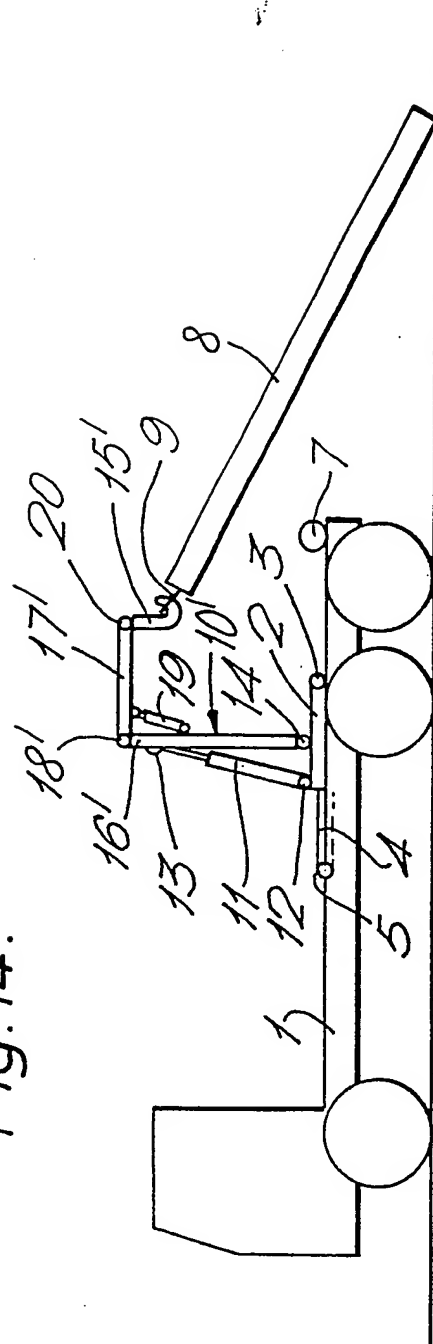


Fig. 14.



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Fig. 15.

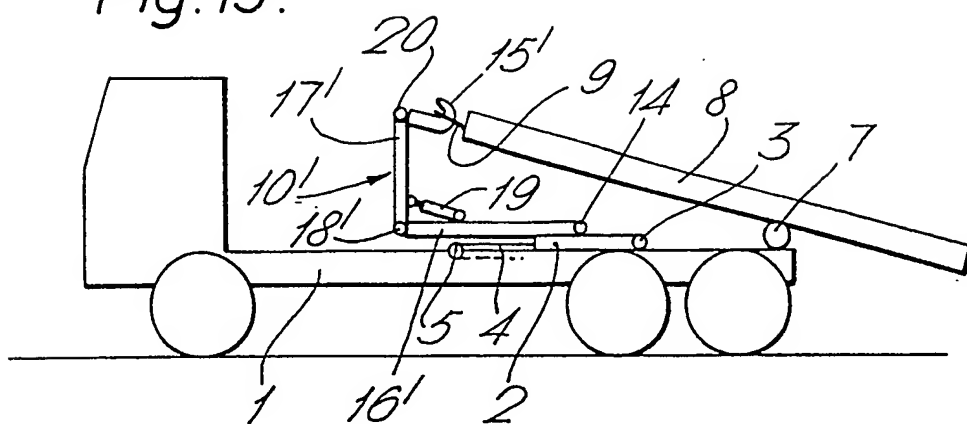


Fig. 16.

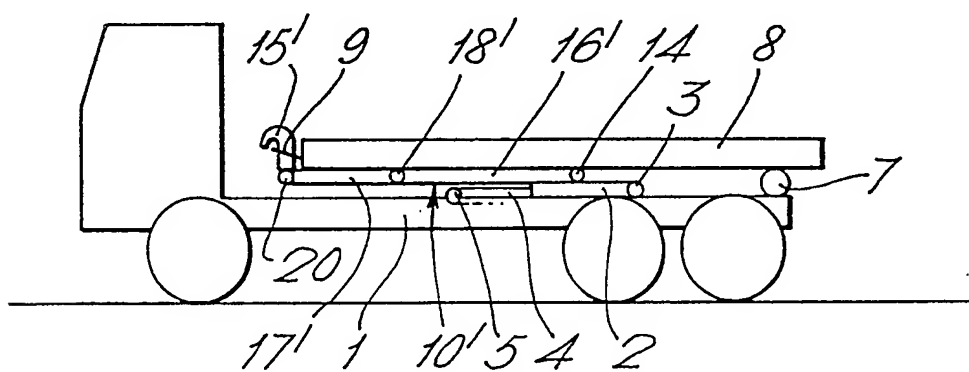
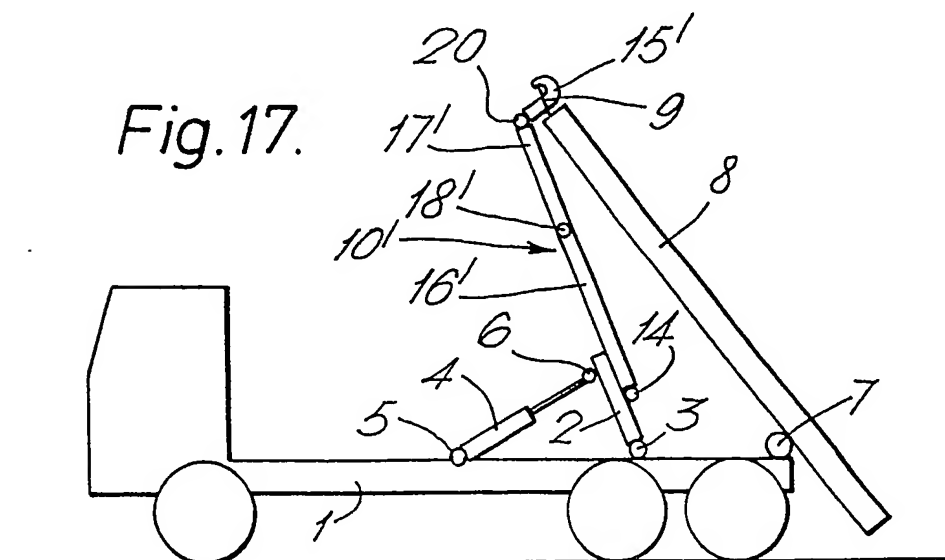


Fig. 17.





European Patent
Office

EUROPEAN SEARCH REPORT

0107892

Application number

EP 83 30 4925

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 7)
X	GB-A-2 092 993 (OY PARTEK) * Figure 2 *	1,3-5	B 60 P 1/48
A	DE-A-2 522 896 (HYDRAULIK-GERGEN) * Figures 1-5 *	1,3-5	
A	CH-A- 512 345 (E. WIRZ AG) * Figure 4 *	1	
A	DE-B-2 726 353 (E. GERGEN et al.) * Figures 4-11 *	1,2,6	
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The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 21-12-1983	Examiner LUDWIG H J
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